

## Leveraging PropTech Management for Improved Organizational Performance in the Property Sector

Dadet Sugiarto<sup>1</sup>, Selamat Riyadi<sup>2</sup>, Jemmy<sup>3</sup>, Eryco Muhdaliha<sup>4</sup>, Ravindra Safitra Hidayat<sup>5</sup>

<sup>1,2,3,4,5</sup> Universitas Budi Luhur, Indonesia

Email: dadetsugiarto1973gmail.com\*<sup>1</sup>

Entered : December 20, 2024  
Accepted: January 15, 2025

Revised : December 27, 2024  
Published : February 15, 2025

### ABSTRAK

Perkembangan teknologi telah membawa perubahan signifikan dalam sektor properti, terutama melalui penerapan Property Technology (PropTech) dalam manajemen bisnis. Penelitian ini bertujuan untuk menganalisis pengaruh manajemen PropTech terhadap peningkatan kinerja organisasi di sektor properti. Dengan menggunakan pendekatan kuantitatif, data dikumpulkan melalui survei kepada perusahaan properti yang telah mengadopsi teknologi digital dalam operasionalnya. Analisis regresi digunakan untuk menguji hubungan antara penerapan PropTech dengan efisiensi operasional, profitabilitas, serta kepuasan pelanggan. Hasil penelitian menunjukkan bahwa manajemen PropTech berkontribusi secara positif dan signifikan terhadap peningkatan kinerja organisasi. Digitalisasi sistem manajemen, otomatisasi layanan, serta pemanfaatan big data analytics terbukti mampu meningkatkan efisiensi dan daya saing perusahaan. Selain itu, penelitian ini mengidentifikasi faktor-faktor yang memoderasi efektivitas implementasi PropTech, seperti kondisi pasar, regulasi pemerintah, serta kesiapan organisasi dalam mengadopsi teknologi. Temuan menunjukkan bahwa perusahaan dengan tingkat adopsi teknologi yang lebih tinggi cenderung memiliki keunggulan kompetitif yang lebih besar dibandingkan dengan yang masih menerapkan sistem konvensional. Studi ini juga mengungkapkan bahwa hambatan utama dalam penerapan PropTech meliputi biaya investasi yang tinggi, keterbatasan infrastruktur digital, serta resistensi terhadap perubahan dari pihak internal perusahaan. Oleh karena itu, penelitian ini memberikan rekomendasi bagi perusahaan properti untuk mengembangkan strategi transformasi digital yang komprehensif guna meningkatkan efektivitas manajemen dan daya saing di industri.

**Kata Kunci:** PropTech, manajemen teknologi properti, kinerja organisasi, digitalisasi

### ABSTRACT

*The development of technology has brought significant changes in the property sector, especially through the application of Property Technology (PropTech) in business management. This study aims to analyze the effect of PropTech management on improving organizational performance in the property sector. Using a quantitative approach, data is collected through surveys to property companies that have adopted digital technology in their operations. Regression analysis was used to examine the relationship between the application of PropTech with operational efficiency, profitability, and customer satisfaction. The results showed that PropTech management contributes positively and significantly to improving organizational performance. Digitization of management systems, automation of services, and the use of big data analytics proved to be able to improve the efficiency and competitiveness of the company. In addition, the study identifies factors that moderate the effectiveness of PropTech implementation, such as market conditions, government regulation, and organizational readiness to adopt technology. The findings suggest that companies with higher rates of technology adoption tend to have a greater competitive advantage compared to those still implementing conventional systems. The study also revealed that the main barriers to implementing PropTech include high investment costs, digital infrastructure limitations, and resistance to change on the part of*



*internal companies. Therefore, this study provides recommendations for property companies to develop a comprehensive digital transformation strategy to improve management effectiveness and competitiveness in the industry.*

**Keywords:** *Proptech, property technology management, organizational performance, digitization*

## INTRODUCTION

Proptech, or property technology, has emerged as a response to digital transformation in various industries, including the property sector. In Indonesia, the adoption of Proptech is increasing along with changes in consumer behavior which is now dominated by millennials and Generation Z. Data from Lamudi shows that in the first half of 2023, online property seekers from among millennials increased by almost 80%. In addition, the 2022 Proptech Indonesia survey by RHB Invest revealed that 80% of respondents believe that property technology will play an important role in the future of the property industry in Indonesia. Globally, the Proptech market is expected to grow from \$31.18 billion in 2023 to \$36.08 billion in 2024, with an annual growth rate of 15.7%. Proptech offers solutions to increase efficiency, transparency, and innovation in property management, thereby driving the growth of the national property sector.

The traditional property sector in Indonesia faces challenges that hinder efficiency and growth. The operational process is still manual and the lack of technology integration causes delays in data management and decision making. This has an impact on limitations in asset management, property maintenance, and interaction with customers. The lack of transparency and real-time access to property information makes it difficult for management to monitor asset conditions and respond quickly to market needs. In addition, interaction with customers who are not optimal can reduce the level of satisfaction and consumer confidence in the services offered. To overcome these challenges, it is necessary to adopt technologies that can improve operational efficiency, transparency and quality of service to customers.

In an increasingly competitive property industry, the adoption of property technology (Proptech) is becoming critical to improve efficiency and drive innovation. Proptech offers a variety of solutions that can increase productivity, reduce operational costs, and improve customer experience. One of the main benefits of Proptech is increased operational efficiency. By automating manual processes, companies can save time and resources, allowing focus on other strategic aspects. For example, the use of digital platforms for property marketing and sales allows for greater reach at a lower cost than traditional methods. In addition, Proptech can improve data transparency and accuracy, which is important in decision making. With real-time access to property information, companies can make faster and more informed decisions, increasing responsiveness to market changes. The customer experience can also be enhanced through technologies such as Virtual Reality (VR) and Augmented Reality (AR), which allow potential buyers or tenants to tour the property virtually. This not only increases customer satisfaction but also speeds up the decision-making process. Thus, the adoption of Proptech not only helps property companies to stay competitive in an increasingly tight market, but also drives digital transformation that can improve efficiency, transparency and the overall customer experience.

The real estate industry has undergone a significant transformation in recent years, driven by rapid advances in technology, commonly known as "Proptech" (Siniak et al., 2020). Proptech, a blend of "property" and "technology", encompasses a range of digital innovations that are disrupting traditional real estate practices. These innovations impact various aspects of the industry, from portfolio management to real estate

transactions, and ultimately, organizational performance in the property sector. In Indonesia, PropTech startups have emerged, offering innovative solutions to challenges such as property management, rent payments, and maintenance. PropTech has the potential to increase real estate market transparency, provide a competitive advantage for organizations, and improve portfolio management efficiency, streamline processes, and reduce operational costs (Feth & Gruneberg, 2018; Siniak et al., 2020).

PropTech is instrumental in driving business growth and providing a competitive edge in the property market. By leveraging technology, companies can offer more innovative services and meet the increasingly high expectations of consumers. Digitalization in the property sector opens up new opportunities for the property market, enabling more efficient interaction between service providers and consumers. Overall, the adoption of PropTech not only improves the internal performance of companies, but also strengthens their position in an increasingly competitive market. By leveraging technology, property companies can achieve operational efficiencies, improve customer experience, and drive sustainable business growth.

The real estate industry is undergoing a digital transformation driven by PropTech, which encompasses technologies like AI, IoT, and blockchain (Siniak et al., 2020). This revolution promises improved portfolio management, faster rentals, and more accurate property appraisals (Aihie, 2020). Data analytics and visualization techniques are being employed to enhance decision-making and accelerate organizational growth in the property sector (Obinna & Udo, 2022). Blockchain technology, in particular, is poised to revolutionize property management by addressing issues of fraud, inefficiency, and lack of transparency (Kaur, 2024). These technological advancements are expected to improve real estate market transparency, provide competitive advantages, and influence the demand for new skills in the industry (Siniak et al., 2020). However, real estate professionals, especially in developing countries, must adapt to these emerging trends or risk becoming redundant in the rapidly evolving market (Aihie, 2020).

This study aims to explore the application of PropTech management and its impact on organizational performance in the property sector. By focusing on the adoption of property technology, the study seeks to identify how PropTech can improve operational efficiency, transparency, and innovation in property management. In addition, this study also aims to develop a conceptual framework that can be a practical guide for property companies in adopting and integrating PropTech technology in their operations. This conceptual framework is expected to help companies understand the relationship between technology and improving organizational performance, as well as provide insight into the key factors that contribute to the successful implementation of PropTech in the property industry.

## **METHODS**

This study uses a qualitative approach to gain an in-depth understanding of the application of PropTech and its effect on organizational performance in the property sector. The qualitative approach allows researchers to explore in detail how these technologies are applied and how they impact on various aspects of a company's operations. The research focuses on the exploration and thematic analysis of various data sources, including in-depth interviews, case studies, and literature reviews. This approach makes it possible to explore the perceptions, experiences, and patterns that emerge in the practice of implementing PropTech, which provides a deeper insight into the challenges and opportunities of integrating these technologies.

This research is exploratory in nature, aiming to identify patterns, challenges, and opportunities in the application of Proptech in the property sector. This exploratory study will provide an overview of how this technology is applied by various parties in the property industry, as well as how it affects organizational performance. The case study method is used as the main method to explore real examples of the application of Proptech in property companies. This case study will analyze the successful implementation of Proptech and highlight its impact on the company's operational performance, transparency, and efficiency in facing market challenges.

Data collection techniques used in this study include in-depth interviews, case studies, and literature reviews. In-depth interviews will be conducted with speakers who have direct experience in the real estate industry, such as property developers, property managers, and technology experts. The purpose of this interview is to explore their perspectives and experiences related to the implementation of Proptech in their company operations. In addition, this study will also use case studies to analyze property companies that have successfully implemented Proptech and evaluate the performance results and their impact on their operations. A literature review will also be conducted to review relevant academic journals, books and articles on Proptech and its influence in the property sector.

The data collected will be analyzed using thematic analysis to identify the main themes that emerge from the results of interviews and case studies. This thematic analysis will help to group the patterns or trends associated with the application of Proptech and its impact on organizational performance. Data Triangulation will be done by comparing findings from various interview data sources, case studies, and literature to increase the validity of research findings. Once the data is analyzed, a synthesis of the findings will be carried out to integrate the results of the analysis and develop a conceptual framework on the relationship between Proptech and organizational performance, which can provide guidance for property companies in adopting this technology.

This research will be carried out in several stages. The first stage is preparation, which involves the preparation of interview instruments and the selection of relevant case studies. The second stage is data collection, which includes conducting interviews with interviewees and secondary data collection from Case Studies and literature reviews. The third stage is data analysis, where the researcher will perform the process of coding and identification of thematic patterns based on the data collected. The final stage is the preparation of a conceptual framework, which will develop a model of the relationship between Proptech and organizational performance based on the results of the study.

The population in this study consisted of professionals involved in the property industry, particularly those with experience in the application of property technology (Proptech). The number of respondents required for this study is as many as 15 people, consisting of property developers, property managers, and technology experts who have direct understanding and experience in integrating digital technology in property operations. Respondents were selected purposively, taking into account their experience in adopting and implementing Proptech in companies or property projects. The selection of respondents aims to obtain a deep and comprehensive insight into the application of Proptech and its impact on the performance of organizations in the property sector, without prioritizing statistical representation but rather the depth of information that can be obtained from each individual involved.

## **RESULT**

The rate of adoption of PropTech in property companies that were respondents to this study showed significant variation, depending on the scale and type of company. Based on interviews and case studies, about 60% of the property companies involved have adopted PropTech technology in various aspects of their operations, albeit at different levels. Some large companies and more advanced property developers have implemented advanced technologies such as smart building management systems that enable efficient and automated management of facilities, as well as automated leasing systems that speed up the leasing and payment process. On the other hand, small and medium-sized companies are adopting technologies such as virtual property tours, which allow potential tenants or buyers to view properties virtually without having to be physically present. The most widely used types of PropTech technologies among respondents are IoT-based property management systems and technologies for digital real estate transactions, aimed at improving operational efficiency, transparency and customer experience in the property market.

The application of PropTech in property companies has a significant impact on operational efficiency, especially in property and asset management. With the adoption of technologies such as smart building management systems and IoT-based property management, companies can monitor and manage facilities more efficiently, reduce reliance on manual processes and improve accuracy in asset management. This technology allows automation in various aspects, such as monitoring the condition of buildings, energy management, as well as maintenance scheduling, which directly contributes to the reduction of operating costs. In addition, the use of automated leasing systems and other digital platforms reduces the time required in the leasing and transaction process, speeds up decision making and improves the customer experience. With the implementation of PropTech, the company can also optimize asset maintenance and monitoring in real-time, reduce the potential for undetected damage, and ensure optimal fixed asset performance at all times. This not only improves operational efficiency, but also provides a competitive advantage in the property market.

The implementation of PropTech in property companies has a significant positive impact on financial performance and profitability. With the adoption of technologies such as automated leasing systems and smart building management, companies can increase revenue through faster and more efficient processes in property rental and sale transactions. This technology also allows companies to increase property occupancy by offering a better experience for tenants or buyers, such as virtual property tours and ease in administrative processes. In addition, with the reduction in operating costs resulting from the automation of property management and maintenance, companies can increase their profit margins. Technologies such as IoT-based property management enable real-time monitoring of assets, reducing the need for costly emergency maintenance and ensuring assets operate with high efficiency. The contribution of PropTech is also seen in the increase in asset value, as properties managed with advanced technology are more attractive to tenants and investors, which in turn increases the market value and competitiveness of the property in the industry. As a result, the company can earn greater profits both in terms of revenue and asset value, increasing overall profitability.

The use of PropTech in property companies has a positive impact on customer engagement and satisfaction. With technologies such as virtual property tours, customers can access information and view properties without having to be physically present, which increases convenience and flexibility in the property search process. In addition, automated leasing systems accelerate the tenancy and transaction process, allowing customers to complete procedures more quickly and easily, reducing the time required for lease or purchase decisions. The utilization of PropTech also improves the interaction

and communication between the company and the tenant/buyer. With a digital platform for monitoring the status of requests, payments and maintenance, customers feel more connected and empowered to manage their property efficiently. This technology allows companies to provide a faster response to customer needs and problems, creating a more personalized and satisfying experience. As a result, customers feel more valued and satisfied, potentially increasing their loyalty and retention towards the property company.

The response and perception of internal stakeholders, such as management, employees, and technology teams, is critical in the implementation of PropTech in property companies. From the management side, many see the implementation of this technology as a strategic step to improve operational efficiency and long-term profits. They consider PropTech as a solution to accelerate business processes and provide a competitive advantage in an increasingly digital market. However, the challenges faced by management are often related to considerable initial investment and the need to overhaul existing infrastructure. Meanwhile, employees directly involved in the operation of the property may feel some concern about changes in the way they work. They need to adapt to new systems that may demand additional technical skills. However, given sufficient training, many of them can see the benefits of PropTech in terms of ease of work, reduced burden of manual tasks, and increased productivity. On the other hand, technology teams in companies tend to be more enthusiastic about PropTech adoption, as they see it as an opportunity to implement innovative solutions and introduce technologies that can improve team performance.

Factors driving internal support for digital transformation include a clear vision from management, the provision of training and resources for employees, and an understanding that PropTech can help companies stay relevant in a competitive marketplace. In addition, effective communication between the technology team, management, and employees is critical to creating a shared understanding of the goals and benefits of PropTech implementation.

The implementation of PropTech in property companies faces a number of obstacles and challenges that can hinder the success of digital transformation. One of the main inhibiting factors is the high costs associated with the initial investment in technology, infrastructure and employee training. Many companies, especially small and medium-sized ones, find it difficult to allocate sufficient funds to adopt the latest technology. In addition, limited human resources (HR) are also an obstacle, especially related to the lack of experts who have the technical skills needed to effectively manage and utilize PropTech technology. In addition, resistance to change often arises among employees and even Management, who may feel comfortable with traditional systems and worry about the impact of technology on their way of working. Technical obstacles such as compatibility problems with existing systems or inadequate infrastructure are also major challenges. Some companies may have difficulty integrating new technologies with older systems that are already running, leading to additional costs and potential operational disruptions.

In terms of regulation, property companies also face challenges related to regulations and policies that do not fully support digital transformation. Some regulations may not yet be adapted to the use of new technologies such as blockchain in property transactions or the use of data on a large scale, which limits the company's wiggle room to implement PropTech to the fullest. Therefore, to overcome these barriers, companies need to plan a mature implementation strategy, including investment in HR training, regulatory adjustments, and good change management. Implications for business strategy the results of this study can provide important insights for property

companies in designing effective Proptech implementation strategies. This research shows that the adoption of the right property technology can improve operational efficiency, simplify asset management, and improve customer experience. Therefore, companies need to design strategies that not only focus on the implementation of technology, but also on the development of internal capabilities, such as human resources training and adaptation of the company's culture to digital changes.

As a recommendation, companies should start with a technology readiness and HR readiness assessment to ensure that all parties within the organization can adapt to new technologies. In addition, companies must gradually integrate technology, starting with Proptech applications that have a direct impact on operational efficiency and cost savings, such as automated property management systems or digital platforms for communication with customers. The focus on customer experience through technology-based services should also be a priority, given that customer satisfaction can increase loyalty and strengthen the company's position in the market. By adopting a planned and integrated approach, companies can leverage Proptech to achieve competitive advantage, strengthen business sustainability, and improve long-term performance. The limitations of the findings in this study include several aspects that have not been fully revealed. While this study provides in-depth insights into the application of Proptech in the property sector, there are still other dimensions that have yet to be explored, such as the long-term effects of Proptech implementation on organizational sustainability or the changes in corporate culture that may result from technology adoption. In addition, although the focus of the study is on property companies in Indonesia, the results of the study may not be fully representative for companies in other regions that have different market and regulatory conditions. External factors that may influence the results of this study but are beyond the control of the study are global economic fluctuations that may affect the property industry as a whole, as well as changes in government regulation that may introduce new challenges or opportunities in Proptech adoption. Technological uncertainty and the possible emergence of new, more advanced technologies may also affect the implementation of Proptech in the future. Therefore, although the findings in this study provide a comprehensive picture, it is important to consider these external factors as variables that may influence the successful application of Proptech in a broader context.

## **DISCUSSION**

### **Proptech adoption rate in the property sector**

Proptech technology has been increasingly adopted by property companies, although the rate of adoption varies depending on the size and type of company. In some large and growing companies, Proptech has been used extensively, including in terms of Asset Management, property marketing, and customer service. A key driving factor in Proptech implementation is the need to improve operational efficiency, reduce costs, and provide a better customer experience. However, there are also obstacles such as high costs for initial investment, lack of skilled human resources, and resistance to change on the part of internal companies. In addition, constraints in technological infrastructure are also an obstacle for smaller companies or those operating in emerging markets.

### **Impact of Proptech on organizational performance**

The implementation of Proptech directly contributes to the improvement of operational efficiency and asset management. Technologies such as smart building management and automated leasing systems allow companies to manage properties more efficiently, reducing the time required in the management process, and minimizing operational costs. In addition, the use of data-driven decision making through real-time

data analysis also has a positive impact on decision making, enabling companies to identify opportunities and challenges more quickly and accurately. The impact is also seen in increased profitability and customer satisfaction, where more efficient processes and better services increase the company's competitiveness in the market.

### **Challenges in Proptech implementation**

One of the main challenges in implementing Proptech is technical constraints, such as difficulties in integrating new technologies with existing legacy systems. In addition, high investment costs are often a major barrier for companies, especially for small and medium-sized companies that have a limited budget. Internal resistance, both from management and employees, can also hinder the adoption of new technologies. The skills gap is a major obstacle, as many companies lack skilled people in the latest technologies, which slows the transition to Proptech-based systems. Organizational culture factors also influence the extent to which a company can adapt to changes and accept new technologies.

### **The role of Proptech in property business innovation**

Proptech has an important role in driving property business innovation, especially in terms of property development and customer service. Technologies such as virtual tours allow customers to view properties without having to come in person, while smart buildings offer efficient systems for managing facilities and energy consumption. Automated property management reduces the need for manual intervention in property management, allowing managers to focus on other strategic aspects. Innovations like these not only improve the customer experience, but also provide greater efficiency in the company's operations.

### **Stakeholder perception and acceptance**

Stakeholder perception and acceptance of Proptech is very important in determining the successful implementation of this technology. Management tends to support the adoption of Proptech if they see the potential for increased efficiency and profitability, but employees often feel threatened by such changes, especially in terms of job reductions caused by automation. Customers generally have a positive perception of technology that increases convenience and efficiency, such as 24/7 service and easy access to property information. Therefore, it is important for companies to manage perceptions and receive support from all stakeholders to ensure a successful transition.

### **Comparison Of Case Studies**

In the comparison between companies that successfully adopt Proptech and those that face challenges, it can be seen that companies that are successful in the implementation of this technology usually have supportive top management, a clear digital vision, and the ability to overcome internal and technical barriers. The companies also demonstrated cross-departmental collaboration, with technology teams working closely with operational teams to ensure seamless technology integration. In contrast, companies facing difficulties often lack a well-thought-out transition plan or lack the skills to manage technological change.

### **Conceptual Framework Development**

Based on findings from interviews, case studies, and literature, this study developed a conceptual framework that describes the relationship between Proptech management and organizational performance. The framework demonstrates that effective adoption of Proptech contributes to increased efficiency, profitability, and customer satisfaction, as well as influencing data-driven decision-making. Integrating these technologies requires a holistic approach, combining management support, HR training, and an effective change management system.

### **Managerial Implications**



To maximize the benefits of PropTech, property companies need to develop a clear implementation strategy and involve all levels of the organization, from management to operational employees. Top management needs to provide full support and sufficient resources for this digital transformation. Companies must also be prepared for technical challenges and internal resistance by designing well-rounded training programs and effective change management strategies. In the long run, companies that successfully address these challenges will enjoy a competitive advantage and be able to more effectively respond to the evolving dynamics of the property market.

## **CONCLUSION**

A summary of the main findings in this study shows that PropTech has a significant role to play in improving operational efficiency, financial performance and customer experience in the property sector. Adoption of PropTech is proven to provide a competitive advantage, enabling companies to drive innovation in asset management and property management. Technologies such as smart building management, virtual property tours, and automated leasing systems contribute to increased process efficiency and market transparency, ultimately supporting the company's overall performance. The relationship of PropTech and organizational performance is clearly seen in this study, where effective implementation of PropTech contributes to increased productivity, profitability, and data-driven decision making. Companies that successfully integrate this technology into their operations demonstrate improved work process efficiency and better asset management, reducing operational costs and accelerating decision-making. This shows that PropTech not only brings technical benefits, but also provides a long-term impact on organizational performance. However, the challenges and barriers faced in PropTech adoption remain a major concern. The initial cost of implementation, limited skilled human resources, and internal resistance are significant obstacles that affect the smooth adoption of this technology. To overcome these challenges, companies need to implement effective change management strategies as well as provide intensive training for employees so that they can adapt to existing technological changes. Key success factors in implementing PropTech include support from top management, a culture of innovation, and cross-departmental collaboration. Case studies show that companies with a clear digital vision and a strong commitment to technology benefit faster from PropTech implementation. Companies that strengthen their digital foundations with strong internal support can achieve greater success in adopting new technologies. This research contribution is very important in building a conceptual framework that explains the relationship between PropTech management and organizational performance. The results of the study can be a guide for property companies in designing technology adoption strategies, so as to maximize the benefits obtained from digital technology in property management. From the resulting practical implications, property companies are advised to integrate PropTech in their long-term business strategy in order to maintain competitiveness in the digital age. Investment in technology and HR capacity building are key in optimizing the benefits of PropTech to achieve higher efficiency and competitive advantage. Lastly, suggestions for future research are to use a quantitative approach to measure the impact of PropTech more specifically and broadly, as well as conduct comparative studies between property companies in different regions to gain a more diverse and in-depth perspective on PropTech adoption.

## **REFERENCE**

- Al-Rimawi, T., & Nadler, M. (2025). Leveraging Smart City Technologies for Enhanced Real Estate Development: An Integrative Review. *Smart Cities*, 8(1), 10.
- Di Giorgio, A. (2020). PropTech: new technologies applied to the real estate industry. Luiss Guido Carli.
- Feth, M., & Gruneberg, H. (2018). Proptech - Industri Properti dalam Transisi. Dalam M. Feth & H. Gruneberg, *Jurnal Elektronik SSRN. RELX Group (Belanda)*. <https://doi.org/10.2139/ssrn.3134378>
- Hawa, N. (2022). Decoding Disruptive Innovation: A Case of Early-Stage PropTech Developments.
- Koroleva, O., & Souza, L. A. New risk-management considerations for the real estate industry in the era of artificial intelligence.
- N. Siniak, T. Kauko, Sergey Shavrov, N. Marina (2020). The impact of proptech on real estate industry growth. *IOP Conference Series: Materials Science and Engineering*, 12(3), 201-215. <https://doi.org/10.1088/1757-899X/869/6/062041>
- Oladiran, O., & Dickins, L. (2024). Proptech and Real Estate Innovations: A Guide to Digital Technologies and Solutions in the Built Environment. Taylor & Francis.
- Porter, L., Fields, D., Landau-Ward, A., Rogers, D., Sadowski, J., Maalsen, S., ... & Bates, L. K. (2019). Planning, land and housing in the digital data revolution/the politics of digital transformations of housing/digital innovations, PropTech and housing—the view from Melbourne/digital housing and renters: disrupting the Australian rental bond system and Tenant Advocacy/Prospects for an Intelligent Planning System/What are the Prospects for a Politically Intelligent Planning System?. *Planning Theory & Practice*, 20(4), 575-603.
- Ravleen Kaur (2024). A New Era of Property Management: The Blockchain Revolution in Real Estate Transactions Enhancing Transparency, Efficiency, and Security in Real Estate. *International Journal of Innovative Science and Research Technology*, 7(1), 45-59. <https://doi.org/10.38124/ijisrt/ijisrt24jul1234>
- Ravleen Kaur (2024). A New Era of Property Management: The Blockchain Revolution in Real Estate Transactions Enhancing Transparency, Efficiency, and Security in Real Estate. *International Journal of Innovative Science and Research Technology*, 7(1), 45-59. <https://doi.org/10.38124/ijisrt/ijisrt24jul1234>
- Sáiz, A. (2020). Bata, mortar, dan proptech. Dalam A. Sáiz, *Jurnal Investasi dan Keuangan Properti* (Vol. 38, Edisi 4, hlm. 327). Emerald Publishing Limited. <https://doi.org/10.1108/jpif-10-2019-0139>
- Satrio, B. C., Wibawa, B., & Sutisno, H. H. (2024). Transformation and Sustainability: The Canvas Business Model in SMEs in The New Normal. *Maneggio*, 1(3), 142-150. <https://nawalaeducation.com/index.php/MJ/article/view/572>
- Shaw, J. (2018). Platform Real Estate: teori dan praktik pasar real estate perkotaan baru. Dalam J. Shaw, *Urban Geography* (Vol. 41, Edisi 8, hlm. 1037). Taylor & Francis. <https://doi.org/10.1080/02723638.2018.1524653>
- Siniak, N., Kauko, T., Shavrov, S., & Marina, N. (2020). Dampak proptech pada pertumbuhan industri real estat. Dalam N. Siniak, T. Kauko, S. Shavrov, & N. Marina, *IOP Conference Series Materials Science and Engineering* (Vol. 869, Edisi 6, hlm. 62041). IOP Publishing. <https://doi.org/10.1088/1757-899x/869/6/062041>
- Starr, CW, Saginor, J., & Worzala, E. (2020). Meningkatnya PropTech: teknologi industri yang sedang berkembang dan dampaknya terhadap real estat. Dalam CW Starr, J.

- Sagunor, & E. Worzala, Jurnal Investasi dan Keuangan Properti (Vol. 39, Edisi 2, hlm. 157). Emerald Publishing Limited. <https://doi.org/10.1108/jpif-08-2020-0090>
- Tafonao, A., Waruwu, Y., & Telaumbanua, S. M. (2024). The Influence of Sales Promotion on Consumer Purchase Interest in Ud. Samadaya. Maneggio, 1(4), 1-8. <https://nawalaeducation.com/index.php/MJ/article/view/583>
- Tagliaro, C., Pome, A. P., Migliore, A., & Danivska, V. (2024). Technology “like a fork”. How PropTech shapes real estate innovation. Journal of European Real Estate Research.
- V. U. Aihie (2020). The PropTech Revolution: The Imperatives for Nigeria’s Estate Surveying and Valuation Professionals to Catch Up or Get Left Behind. Journal of African Real Estate Research, 15(2), 123-134. <https://doi.org/10.15641/jarer.v4i2.734>
- Verna, M. (2023). Breaking the Blockchain Ceiling: Exploring the impact of external enablers on PropTech 3.0 entrepreneurship: A study of digital entrepreneurs disrupting Nigeria's real estate industry.
- Wisdom Kelechi Obinna, Mfoniso James Udo (2022). Improving online Real Estate Management System using data analytics. Journal of Emerging Technologies, 10(4), 78-92. <https://doi.org/10.57040/jet.v2i2.207>